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COMMUNICATIONS

ULTRA-VIOLET LIGHT IN THE TREATMENT OF OPHTHALMOLOGICAL DISEASES

II.—LOCAL PHOTOTHERAPY

BY

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IN the previous paper it has been suggested that ultra-violet radiation has a definite place in ophthalmological therapeutics; in certain diseases the local application of light has a more pronounced beneficial effect. It was also suggested that general light baths should only be given with a certain degree of care; very much more is required in local phototherapy.

The action of ultra-violet light is primarily abiotic, that is, destructive. The most readily observed effect produced in the radiation of a cell is the photo-chemical denaturation and subsequent coagulation of its proteins. This, with other reactions, leads to the production of a certain amount of trauma, involving the partial or complete destruction of the cell, an effect which is evident after radiation of the skin in the desquamation of its outermost layers. In the tissues of the eye a similar reaction takes place; with small intensities the radiated cells are injured, with great intensities they are destroyed. In many diseases of the conjunctiva and cornea this is the end which, under proper control, is desired, and the active response which the traumatism of light evokes, repairs, and more than repairs, the damage—again within limits.

In the case of the lens, however, the matter is different. This is an avascular tissue in which active repair is comparatively lacking, and here damage tends to be cumulative. Coagulation of the proteins of its cells is recognised clinically as cataract, a condition which can be produced experimentally by radiation with ultra-violet light. With radiation of such intensity as does not produce an opacity immediately, changes take place in the colloid system of this tissue with the result that the proteins are rendered more labile and their subsequent coagulation by other influences more easy. Moreover, the autoxidation system of the lens, upon which it probably depends in large measure for the maintenance and regulation of its metabolism, is damaged by ultra-violet light; while in addition, the permeability of the capsule is altered after radiation, thus further increasing the susceptibility to pathological changes (see Duke-Elder, 1926).

It has been urged that in the comparatively small doses in which it is used clinically there is little fear of such damage being caused by the radiation of the eye; but it is to be remembered that small doses such as have no apparent effect predispose to the formation of cataract, and it is further to be borne in mind that in many diseased eyes the possibility of a complicated cataract without any artificial stimulus is by no means remote. In any technique of local phototherapy, therefore, it is essential that the lens be excluded from the path of the incident rays.

Experiment has shown that the lens absorbs a large proportion of the shorter waves of the spectrum below 4,000 A.U. and all of the incident light below 3,300 A.U. Since for clinical purposes the upper limit of abiotic activity may be taken as about 3,000, it would appear that any attempt to radiate the choroid or retina through the lens, apart from the danger to this structure, is useless. Local ultra-violet light therapy is therefore only applicable to the structures in the anterior segment of the eye. A considerable amount of active radiation can pass the cornea, and it is possible to produce an abiotic effect in the iris; there is, therefore, justification for radiating the iris with a properly controlled beam in cases where it is specially indicated. Such a case would be presented by a tuberculous iritis with nodules on the anterior surface of the iris; but on the whole it may be taken that the sphere of general usefulness of this method of treatment is limited to the cornea, sclerotic, and conjunctiva.

Diseases of the Cornea and Sclerotic

In the series of 119 cases which are reviewed in this paper, 99 were infections of the cornea and sclerotic, and 20 were of varying types of conjunctivitis. The first class was as follows:

Corneal ulcers	56 cases.
Phlyctenular kerato-conjunctivitis	14
Acne	5
Herpes	1
Corneal opacities	9
Episcleritis	4
Sclero-keratitis	10

Technique

In the treatment of diseases of the cornea it is essential that the beam of light should be adequately controlled, in order that it may be limited to the diseased area and unnecessary traumatism be thus avoided, and that the lens be excluded from its path. For this purpose we employ an ophthalmic radiation lamp, which has already been described and figured in this journal (1927): in principle it is a modified Gullstrand slit-lamp fitted with a mercury vapour lamp and provided with an optical system of quartz. With such an instrument a beam of considerable intensity and any desired size can be used, and its precise incidence upon the eye can be observed through the binocular microscope. In all cases it is easy to avoid the lens by inclining the beam at a sufficient angle, the manipulation being facilitated in some cases where the pupil is very large by the previous exhibition of eserine where it is not contra-indicated.

Other methods have been proposed from time to time. Koeppe (1919) and Birch-Hirschfeld (1922) employ a carbon arc as the source of light, but this emits a very large amount of heat: infra-red rays readily penetrate into the tissues of the eye and are potent for harm (Duke-Elder, 1926), while any attempt to filter them off necessarily reduces the intensity of ultra-violet rays considerably. Asher (1922) uses a quartz rod as a director along which the ultra-violet rays are guided, but although such a method is very suitable for radiating the conjunctiva, it is impossible to control the beam of light with sufficient accuracy by its use in the case of the cornea.

Dosage.—In radiating the cornea extreme care must be exercised with the dosage. The intensity of light required to produce an abiotic reaction upon this tissue is practically the same as, but very slightly less than the amount which produces an erythema upon the skin. The response, moreover, varies with different individuals just as it does in the skin. It is always best, therefore, to test the erythema dose on the skin of the arm in each individual patient, and to commence radiating the cornea with a dose slightly less than this. In those cases where treatment is required urgently, as for example in some corneal ulcers, it may be inadvisable to wait the twenty-four hours necessary for the development of the

cutaneous reaction, and it may be necessary to start immediately with an average dose. This may be taken as representing a period of radiation lasting three to three and a half minutes with the apparatus described, where the mercury vapour lamp is of the atmospheric pressure (K.B.B.) type, and runs on 220 volts, 2 to 3 ampéres. Once the initial dose is obtained and its reaction observed, subsequent doses are based upon it, but the increases are to be graduated with care for it must be remembered that a small increase of a minute may make the difference between a mild and a violent photophthalmia.

Since the beam is always kept at a focus upon the cornea, the distance of the lamp must be kept constant, and dosage is altered only by time. Allowance must be made, however, for the obliquity of the rays, for it is evident that if the rays are not falling normally upon the cornea, account must be taken of the resulting diminution of their intensity per unit area. In this case the energy varies quantitatively as the cosine of the angle of incidence, this angle being that which the incident ray makes with the normal to the tangential plane. The following table gives the factor by which the time of exposure determined for a normal ray should be multiplied to give an equivalent exposure with oblique rays:

Angle of incidence.	Cosine.	Factor.
0° (*i.e.* normal)	1.000	×0.00
15°	0.966	×1.03
30°	0.866	×1.16
40°	0.766	×1.30
45°	0.707	×1.40
60°	0.500	×2.00

Biological Action upon the Cornea

The biological reaction to light as seen in the cornea of radiated subjects and experimental animals has already been described at some length (1926), and it is only necessary here to note some of the essential characteristics. The reaction starts after a latent period, usually of six to eight hours, which varies directly with the length and intensity of the exposure. During this time no changes can be made out macroscopically or microscopically. Thereafter with mild degrees of radiation, there is a stippling of the cornea with irregularity of its reflex and sometimes vesicular formation accompanied by hyperaemia of the conjunctiva. After more intense exposures the corneal epithelium is desquamated, and bright staining can be obtained with fluorescein. Greater intensities of radiation produce in the more anterior layers of the substantia propria a diffuse interstitial haze which tends to disappear

rapidly; more intense exposures still (as may be seen in experimental animals) leave an opacity, which in a few week's time, becomes highly vascularized and very largely tends to clear up. The changes are at their height in 48 hours, and thereafter gradually subside, the rate of subsidence varying directly with the intensity of radiation. In three days after a moderately severe exposure the epithelium has reformed and the eye appears normal.

Histological examination in experimentally radiated animals conducted 48 hours after a moderate exposure shows that the surface epithelium is completely absent; with a less severe exposure the surface cells only are exfoliated, and the basal cells are spread out and spaced apart. The lamellae near the affected area in the more severely radiated cases are swollen, and stain less readily with eosine, while the corpuscles show nuclear fragmentation and granular formation in the cytoplasm. Meantime there is a marked infiltration round the limbus, the capillaries are greatly dilated, and eosinophile cells are seen in large numbers in the substance of the cornea. These changes are accompanied by the characteristic symptoms of photophthalmia: after small doses there is merely a sensation of pricking as of a foreign body in the eye; after intense doses a considerable disturbance occurs, involving much pain, accompanied by marked photophobia, lacrymation and blepharospasm.

In the treatment of the cornea, in the great majority of cases a mild reaction is the end desired. In most cases any severe after-effects are contra-indicated, and within three days the reaction should have completely subsided. The pain of the photophthalmia is due to the exposure of the corneal nerve endings after the desquamation of the epithelium, and in such conditions as corneal ulcers where the epithelium is already gone, provided the rays are allowed to play on the ulcerated area only, the subsequent irritation is almost negligible. The latent period which elapses before the reaction starts is about eight hours, and it is the practice to conduct most of the treatments during the afternoon. In this way the symptoms occur during the night, and if the patient has the eye bandaged up so that the lids do not abrade the radiated area, he frequently experiences no subjective symptoms at all, especially if a small dose of aspirin be given before going to bed to ensure a sound sleep.

Corneal Ulcers

Corneal ulcers respond remarkably well to radiation with ultra-violet light. This seems to apply, within limits, to any form of ulcer, but inasmuch as a mild case of acute ulceration tends to heal up in any case with the usual methods of treatment, it is in the chronic and recurrent forms where ulceration has been active

and an eye injected over long periods of time, that the beneficial effect of treatment is seen to the best advantage.

This action appears to depend on several factors. First, the question arises of the direct killing by radiation of the organisms responsible for the ulceration. This certainly occurs in the superficial layers, but the absorption of the abiotically active rays in traversing the substance of the cornea is so great that little of this effect can remain in the deeper layers. The freshly excised cornea of the rabbit, for example, protects colonies of staphylococci sown on agar plates from the lethal action of light, and if the anterior chamber of the same animal be injected with a culture of this organism, and thereafter the animal be exposed to radiation of such intensity as produces a corneal opacity, the aqueous shows on culture a growth no less abundant than that obtained from unradiated controls (Duke-Elder, 1926). Within the limits of intensity of radiation which are justifiable clinically, therefore, it would seem impossible to sterilize the whole thickness of the cornea (Verhoeff and Bell, 1916), although it would appear that a lesser inhibitory effect on the growth and activity of micro-organisms may possibly be obtained: thus Hertel (1907) demonstrated that bacteria suspended in a quartz cell in the anterior chamber could be rendered immobile by ultra-violet light. On the other hand the whole of the infected area of epithelium with its contained organisms can be destroyed and exfoliated, and a milder abiotic action can be exerted with perfect safety extending into the superficial layers of the corneal lamellae. In this connection if a sensitizer could be found which would attach itself to bacterial protein in preference to that of the corneal tissue, it would be of great utility.

A second factor which enters into the question is the great vascular reaction which radiation excites. Especially is this evident in chronic ulcers of long standing which have remained in a torpid condition; after several applications of light they can be seen by the slit-lamp to become traversed by innumerable small vessels of new formation. It is possible that the abiotic reaction, involving the production and absorption of photo-chemical products from the injured corneal cells may have a therapeutic influence also; but about this little is at present known. Lastly, and of considerable importance, the stimulus of ultra-violet light to epithelial growth cannot fail to exert a definite influence on the sound healing of an ulcer. This effect of radiation whereby the basal cells of the skin are stimulated to active mitosis and growth was noted in the previous paper; the same occurs in the cornea, and the fact that a recurrent ulceration which has constantly given trouble despite ordinary treatment for several years, may be epithelialized over after light treatment in such a

manner that no recurrence has occurred over periods of observation extending to eighteen months, speaks for itself.

The types of ulcers which were treated are these (70 cases):

Acute simple ulcer	14 cases.
Hypopyon ulcer	3
Chronic ulcer	14
Dendritic ulcer	2
Recurrent ulcer	23
Phlyctenular ulcer	14

In every case a cure was obtained, in that the ulcerative process healed and the eye became quiet. No other treatment was given except atropine, and, in some cases, heat.

Acute ulcers.—As a rule a single exposure to ultra-violet light is sufficient to cause an acute ulcer to heal; three out of the fourteen treated were of a widespread nature and required a second application four days later, three required a third. The procedure adopted is to instil cocaine into the eye, which is followed by fluorescein, which again is washed out by cocaine. The ulcer is then examined through the ultra-violet slit-lamp, a uviol filter being interposed. A remarkably beautiful and well pronounced fluorescent effect is obtained in this way, and the extent of ulceration is clearly defined. The beam is accurately focused so that it plays upon the ulcerated area and, if possible, on no other part of the cornea; the uviol filter is then turned off and the unfiltered light allowed to fall upon the eye. If in spite of the cocaine the patient is unable to keep his eye open during the whole of the time necessary for treatment, there is no disadvantage in interrupting the treatment for some time, for intermittent exposures are additive in their effects and have the same cumulative action as a single long exposure so long as the interval between them does not exceed twenty-four hours.

No scar is left in the majority of cases, the usual sequela being a shallow transparent facet.

Female, aged 29 years. Three weeks after confinement, looked ill. Large staining ulcer of about 4 mm. diameter right eye. Intense congestion and much pain. Conjunctival swab showed pneumococci. Three light treatments with atropine. Two days following the first much of the pain away, and ulcer showed general diffuse staining. After the second a few staining points centrally. After the third, ulcer healed, eye quiet, with a faint hazy nebula, vascularized.

Female, aged 12 years. Ulcer of three weeks duration. Still staining after two carbolizations. Two treatments: eye quiet, ulcer healed.

Hypopyon Ulcer.—Here again the results are extremely satisfactory.

Male, aged 56 years. Central traumatic ulcer with hypopyon; much dental sepsis. Three treatments: after the first, eye much less painful and hypopyon diminished; after the third, eye quiet, hypopyon away, leaving an opaque scar.

Female, aged 30 years. Irido-cyclitis right, three months. Much k.p. with deep injection. One course of twenty general treatments; eye better, a few pigmented k.p. remaining. Three weeks later, traumatic ulcer right, with large hypopyon. Three local treatments: eye white and hypopyon away, opaque corneal scar. A further course of twenty general baths given.

The results of the treatment of hypopyon ulcer recorded in this paper are, unfortunately, comparatively few; but Hoffman (1927) from the clinic of Birch-Hirschfeld at Königsberg, where direct radiation has been practised in the treatment of this form of ulcer for several years, gives extremely favourable statistics covering a series of 190 cases. These he divides into three classes: mild cases where the hypopyon was merely visible (65 cases), severe cases, where the hypopyon filled from a quarter to one-third of the anterior chamber (63 cases), and grave cases where the hypopyon was larger and other infections were present in the eye (62 cases). Under ultra-violet light treatment, all of the first two series recovered, and of the third series nine eyes were lost. This, a loss of 4.6 per cent. only, over a large series of hypopyon ulcers including all cases as they arrived at the clinic, is a remarkable result. Before the method was introduced as a routine, the incidence of excisions in such cases at Königsberg was 32 per cent. Judging from the dissatisfaction expressed regarding the usual methods of treatment at the symposium on hypopyon ulcer at the meeting of the Ophthalmological Society of the United Kingdom at Liverpool in 1927, this would appear to be the method of choice in these cases.

Chronic Ulcer.—Under this heading are classed those ulcers of the cornea which have progressed over a long period in spite of treatment; most of them were associated with a varying degree of deep keratitis and corneal opacity, and many with iritis and irido-cyclitis. The aetiology of many was considered infective, while some appeared to be tuberculous. In the majority of these cases the patient was an unhealthy subject, and the eye had reached a torpid and sluggish state. The usual treatment given was a course of general light baths, with in addition, three, four, six or more local treatments as seemed indicated. As a result they all cleared up eventually, the eye becoming quiet and comfortable, but with the opacity which had been present before the commencement of treatment unaltered.

Female, aged 16 years. Cyclitis and keratitis with a chronic ulcer in the right eye, twelve months. No obvious infective focus, von Pirquet positive; considered tuberculous. Carbolized on acute exacerbations in Jan., Nov., and Dec., 1925, with little or no improvement. Tuberculin treatment without effect. One course of twenty general baths; very slow improvement in the corneal condition, with continued irritability. Four local treatments: eye quiet and comfortable, no injection, ulcer covered by epithelium leaving an opacity. A further course of general treatment; since which time the eye has remained quiet until the patient passed out of observation (15 months). This occurrence is typical where general light treatment makes little impression; local radiation clears up the condition with great rapidity.

The most chronic case (of unknown aetiology) which had been active for several years, and which had been carbolized on numerous occasions and had a peritomy performed twice with little beneficial result, required twelve local treatments in addition to sixty general baths before the condition subsided.

The two cases of *Dendritic Ulcer* radiated healed over after two applications of light.

Recurrent Ulcer.—Recurrent ulcers, especially those marginal ones associated with a continually relapsing conjunctivitis respond particularly well to light treatment. The ulcer itself clears up, which, of course, is usually easily brought about, but after the epithelium round the ulcer has been desquamated in the photophthalmic reaction following exposure to ultra-violet light, the new layer seems healthy and resistent so as to withstand the liability to break down on future occasions. As a general rule the ulcer heals up after the first or second exposure, and in the milder cases heals up leaving a transparent facet; but it is the custom in most of these cases to give them a third or fourth exposure bringing about a mild reaction each time involving a traumatism and renewal of the epithelium in order to render the possibility of recurrences more remote.

Female, aged 37 years. Recurrent corneal ulcer four years with intermittent conjunctivitis, with an attack of ulceration as a rule about every eight weeks. Treatment started in the course of an exacerbation. Eye quiet after first treatment; four treatments given; eye has remained quiet from March, 1926 to December, 1927, and this in spite of two attacks of acute conjunctivitis, an occurrence which surprised the patient to an amusing extent.

Phlyctenular Ulcers.—Acute phlyctenular ulcers respond so well to general light treatment that it is not worth while as a rule to coax a child affected with this disease to submit to keeping its eye open in the beam of the slit-lamp. It is in the chronic cases which have gone on for years, leaving an ulcerated, opaque, and vascularized cornea, and involving continued irritation frequently with acute exacerbations, that the method has its greatest use. Here again it is best employed along with general light baths. In these cases the eye quietens down and becomes white and comfortable, but the extensive opacities which are already present with the resulting diminution of vision, remain.

Female, aged 21 years. Phlyctenular kerato-conjunctivitis "since ever she could remember." Both eyes showed active scars with staining areas and many new vessels; photophobia and constant lacrymation. Sixteen general treatments; eyes still active, but less so. R.V. 6/60; L.V. less than 6/60. One local treatment; photophobia and lacrymation away. Five local treatments given at intervals of one week along with general treatment. Eye quiet "for the first time she can remember." R.V. 6/36, L.V. 6/60.

Male, aged 26 years. Phlyctenular kerato-conjunctivitis "for many years." Deep ulcers, R. and L., blepharitis and conjunctivitis, corneae opaque. Six general baths, eye less irritable and general health much improved. One local treatment, local condition relieved. Four local treatments given with forty general: eye white with corneal opacities unchanged. Three weeks later, a cold and a relapse with a small ulcer in the right eye. Three local treatments and a course of general treatment: eye quiet, and remained so nine months.

Acne.—The corneal lesions of acne usually tend to subside rapidly after three or four local applications of light along with general baths directed especially to the regions of the skin most affected. After the first two treatments the intense photophobia and pain usually subside. Three of the series of five cases were very chronic ones having gone on for 4, 6, and 12 years; in each the irritation subsided and the eye became quiet, the extensive corneal opacities, however, being unaffected. One, a man, aged 42 years, had a pustule forming an interstitial abscess in the cornea; after six applications this had cleared up leaving a small opaque scar, and the eye was white and quiet six months later.

The one case of *Herpes febrilis* which was treated received little or no benefit.

Corneal Opacities.—In order to investigate claims in the literature, a series of nine cases of old corneal opacities were given a fair trial with local radiation. No results justifying the continuation of the treatment were seen anywhere. It is certainly the case, however, that recent opacities, such as those following ulceration, may be improved, and the prophylactic action of the treatment of ulceration by light in the prevention of opacity formation is very marked. Two factors seem to enter into this: the rapidity of healing with new-formed epithelial cells, and the large amount of vascularization which the photophthalmic response excites. To this extent its action would seem to be comparable to that of an irritant, such as dionine.

Episcleritis and Sclero-keratitis

Four cases of episcleritis were treated by local radiation, all with good results; but as this termination is not unusual in any case, more importance should be attached to the cases of deep sclero-keratitis. Each of the ten cases treated was in a chronic and serious condition; but they all eventually yielded to prolonged treatment. It was found that general radiation alone was unable to arrest the disease satisfactorily in some cases, but so far as experience has gone, the combination of the two methods has resulted in the establishment of a quiet eye, although, in some, an eye of little use for visual purposes from corneal damage due to the process of the disease. If the cases were got earlier under the influence of treatment, very good results would probably have been obtained.

Female, aged 35 years. Sclero-keratitis right, two years: dental sepsis. Sclera deeply injected, thinned, and bluish three-quarters of the way round the limbus. Invasion of the cornea over the corresponding area, the opacity extending well over the pupillary aperture. Eye painful and irritable, iritis with posterior synechiae. R.V. counts fingers at three feet. General light baths—9 mercury vapour lamp followed by 19 carbon arc exposures. Iritis seemed less, pupil dilating, but eye still injected and irritable. A further course of 18 general baths: eye still injected although quieter. Five local treatments: eye quiet and comfortable, corneal opacity

receded to well past the central area. A further course of 15 general treatments: eye still quiet, R.V. 6/36.

Female, aged 28 years. Sclero-keratitis, presumed to be tuberculous, nine months. Scleritis extending three-quarters round the limbus on the inner side, with corneal invasion at the upper and lower quadrants. Twenty general light-baths; eye painless but still considerably injected. A further course of 18 treatments; eye still injected, with intermittent exacerbations of pain and irritability. Seven local treatments: eye quiet and comfortable, corneal opacity largely receded.

Diseases of the Conjunctiva and Lids

The following cases of diseases of the conjunctiva and lids were treated:

Chronic conjunctivitis (simple) ...	6 cases.
Trachoma	6
Vernal catarrh	3
Chronic blepharitis	5

On the conjunctiva ultra-violet light has the same reaction as it has upon the skin. The superficial cells are traumatized, killed, and exfoliated, and the mucous membrane underneath receives a stimulus which rapidly renews the desquamated layer. Any pathological organisms in the superficial layers are thus killed and cast off. The reaction is not nearly so easy to produce as in the skin, and, especially in a vascularized and chronically inflamed conjunctiva, exposures of ten to fifteen minutes to the mercury vapour lamp may sometimes be required. With severe exposures the eye has the appearance of an intense conjunctivitis; it is red and

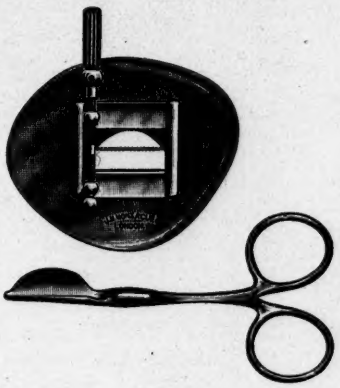


FIG. 1.

Lid-everting forceps. When the forceps has gripped the lashes and the lid has been everted, the guard is attached to the holder on the forceps, so that the everted lid is opposite the aperture. The size of the aperture can be varied to correspond with that of the lid by approximating the slides seen in the figure, which are controlled by a two-way screw. (Made by Montague, Bond Street, London).

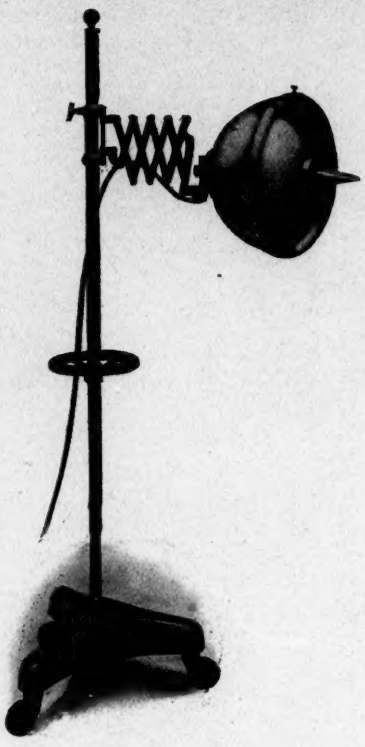


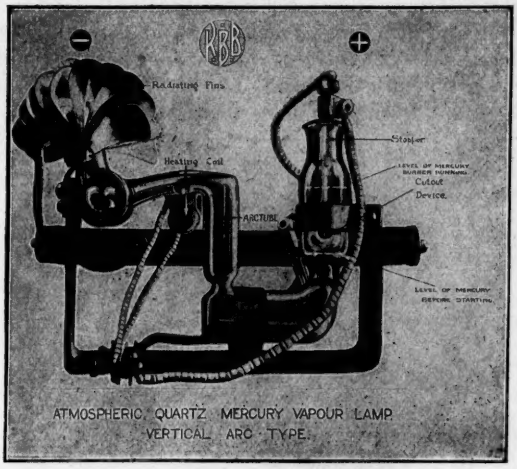
FIG. 2.

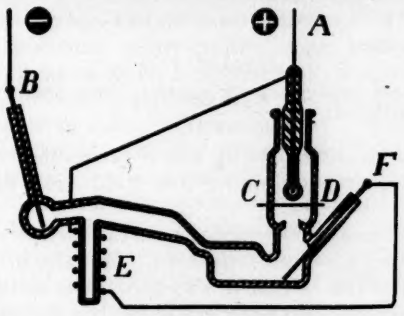
Mercury vapour lamp as used for general radiation fitted with an aluminium housing into which can be inserted a metal tube director (Fig. 5), or a quartz director (Fig. 6).

inflamed with a swollen conjunctiva, and there is always a certain amount of secretion, which contains large numbers of eosinophile cells. In the more intense degrees of the reaction, this may become frankly purulent. The reaction is at its height in about 48 hours, and usually lasts two or three days, the duration varying with the intensity of the exposure. It is not accompanied by any pain and with very little discomfort, so long as the cornea is protected from the light during the radiation; it is the desquamation of its epithelium and exposure of its free nerve endings which cause the intense pain and photophobia of a typical photophthalmic reaction.

Technique.—The technique employed varies with the area of the conjunctiva to be radiated. If the palpebral surface of the lids is to be exposed, these are everted with the lid evertor seen in Fig 1. The lashes are gripped in the forceps in such a way that

the flange attached to the posterior blade lies upon the skin surface of the upper lid pointing upwards; the lids are then everted by rotating the forceps round so that the flange fully everts the tarsal plate, and then the shield is fixed on so that the everted lid appears





FIGS. 3 and 4.

Type of mercury vapour lamp with vertical arc used both in the ultra-violet slit-lamp and in the lamp of Fig. 2. It consists essentially of a U tube filled with mercury, one end of which (B, Fig. 4) is sealed, and the other (A, Fig. 4) is closed by a stopper. There is a small branch tube (E, Fig. 4) surrounded by a heating coil. This the current raises to a red heat, and thus the mercury in E is boiled to a vapour. The expansion thus caused drives the mercury up the other end of the U tube from its original position (C D), thus making contact with the electrode at A. A cut-out device then diverts the current through the mercury vapour, making an arc in the vertical tube.

through the hole cut near its centre. An aluminium cone (Fig. 5) is fitted on to the housing of the mercury vapour lamp, its end being shaped to correspond with the conjunctival surface of the everted lid, and this is brought to within half an inch of the patient, who remains with his head on a head-rest during the treatment. The cornea and the skin of the face are thus efficiently covered, and the lid is easily steadied, while it is fully exposed to the unfiltered rays of the mercury lamp at a short distance, thus receiving a powerful radiation. The mercury lamp is used since its emanations contain little or no heat rays; if the carbon arc were

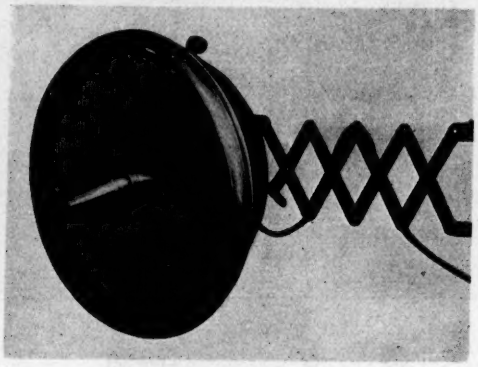


FIG. 5.

Cone-shaped director tube for radiating the conjunctival surface of the everted lids.

employed in such treatment, it would be necessary to interpose a cooling cell of quartz containing cold circulating water in the path of the light.

When the recesses of the fornices are radiated, the light is guided into them through a quartz director. Initially in the practice of the clinic a solid rod of quartz was used, but, since the absorption of energy in passing through six inches or thereabouts of quartz is by no means inconsiderable, this has now been replaced by a hollow cone of polished aluminium upon whose tip is attached a small point of quartz, shaped to correspond with the extent of the superior fornix and so bent as to insinuate itself up into it. Some freedom of movement is obtained by fixing the quartz point to the aluminium tube by a spring joint (Fig. 6). The under surface of the quartz point, that is the surface which rests upon the upper part of the cornea and the sclerotic is silvered and blackened, so that the rays are reflected up into the fornix and

are effectually prevented from reaching the eye, and thus, the light being led along the quartz point by internal reflection, this inaccessible part can be radiated with comparative ease.

Chronic Conjunctivitis.—Six cases of conjunctivitis of very long standing were treated; in each of them considerable improvement was seen. Two were in children, and the local treatment combined with general light baths brought about a rapid change for the better, and they were considered cured after four applications. Four adults were treated before the technique outlined above was adopted; three were so considerably benefited after eight treat-

FIG. 6.

Quartz director for radiating fornices. The quartz tip is attached to a hollow aluminium tube by a spring joint which allows of movement in all directions. The under surface of the tip is blackened and silvered.

ments as to warrant cessation of treatment, and one did not persist in the treatment beyond the third application.

Trachoma.—Six cases of trachoma come under this review. Four appeared to be so much benefited as to warrant the cessation of treatment, and have remained in a comfortable condition for periods ranging from nine to fifteen months. Both of the others cleared up considerably at first; they were both young adult girls, both with very active disease, with large fleshy follicles on the conjunctiva, an immense amount of pannus vascularizing the entire cornea, both with frequently breaking down ulcers, and suffering continuously from photophobia and profuse lacrymation. Visual acuity could not be elicited in either. After bi-weekly treatments for four weeks both cleared up immensely, so that the photophobia and the greater part of the subjective symptoms had disappeared and the visual acuity reached 6/36 in both. Thereafter both had relapses in spite of treatment. One was put back on silver treatment, and was lost sight of. The other continued with the light treatment, and again improved, until after three months treatment, during which time another small relapse occurred; the eyes were comfortable, the conjunctival follicles had subsided, the pannus was in great measure cured and inactive, and the visual acuity had reached 6/60 and 6/18.

Since the period covered by this paper, which was restricted up to July, 1927, in order to obtain end-results of some value, a considerable number of additional trachoma cases have been treated. The majority of these have responded extremely well, better, indeed than the earlier ones. The improvement is probably due to increased efficiency in technique. No case seems too bad to be benefited; most show a response much more satisfactory than is obtained by silver or copper, and the absence of excessive scarring and cicatricial deformity is especially notable.

It is difficult to get a good photophthalmic reaction with an inflamed and fleshy conjunctiva, and very long doses up to ten or fifteen minutes must be given. The cases which did well did remarkably well, the follicles disappearing rapidly, and the cornea especially showing a marked change for the better. The ideal to be aimed at is to get, where possible, a reaction sufficient to exfoliate the superficial layers of the mucous membrane, and to repeat this process as soon as a new one has formed until the final conjunctiva seems healthy. Such a reaction causes little inconvenience to the patient, who as a rule merely appreciates a lessening of the distressing symptoms of the disease.

Vernal Catarrh.—The position in regard to vernal catarrh is that we feel that more extended experience is necessary. Of the three cases treated, one recovered after six weeks' treatment, one showed a marked improvement and then was lost sight of, and the third, after improving at first, relapsed and persisted having relapses over a period of treatment lasting fifteen weeks. At the end of this time the irritation was much less, but follicles were still present, and the treatment was discontinued.

Chronic Blepharitis.—Five cases of chronic blepharitis were treated by direct radiation. They were all of the chronic ulcerative type occurring in children which had resisted the usual treatment, and which was progressing to the loss of the lashes. The closed lids were radiated through a slit-aperture for periods varying from ten to twenty minutes, thus giving a severe reaction. After a few exposures, combined with the ordinary routine of general light baths, all of them cleared up, and in two, the lashes which were reduced to a meagre quantity, grew again to a considerable extent.

To summarize, it would appear that the clinical use of local radiation with ultra-violet light should be limited to the treatment of diseases of the cornea, the sclera, the conjunctiva, and the lids. In selected cases of these its effect is often dramatic. Particularly is this so in the case of corneal ulcers of all kinds, ranging in severity from a hypopyon ulcer to the small recurrent and marginal ulcers which are often so troublesome. In these cases ultra-violet light therapy would undoubtedly seem to be the treatment of choice. The treatment is also decidedly indicated in cases of sclero-keratitis, and in many chronic affections of the conjunctiva, including the most severe cases of trachoma. In all of these where the aetiology is tuberculous the results of treatment are the

most satisfactory. Two further conditions of which no case has appeared up to the present at the clinic, may be added : tuberculous conjunctivitis, and lupus. These have both been treated with somewhat similar methods with very good results on the Continent (see Bibliography, Lundsgaard, etc.), while many cases of the cure of the latter have been obtained at the Clinic at Alton under the care of Sir Henry Gauvain.

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BIBLIOGRAPHY OF PHOTOTHERAPY

Although light has not been used scientifically as a therapeutic agent for many years, the bibliography which has accumulated around it is already enormous. Some of the more important references have already been alluded to in the text of the present two papers, from which others can be obtained. A very brief sketch of the development of the subject, however, may not be without interest.

Primitive people have worshipped the sun and its light from the earliest times of which we have record (the Arabians, the Egyptians, the Persians, the Greeks, the Druids, and so on), more, it would appear, from its power of driving away the spirits of darkness and disease than for its actual power of healing. The first practitioner to advise and practise heliotherapy of whom we have record was **Hippocrates** (*c.* 400 B.C.), and the Asklepieion, the Temple of Æsculapius, the son of Phoebus Apollo, in the island of Cos in the Greek Archipelago, appears to have been the first Light Clinic. The value of the sun as a therapeutic and restorative agent was also known to the Romans, and the solaria of the patrician palaces testify to the popularity of the sun-bath. **Celsus** and **Galen** both used and advised treatment by sunlight; but after their time the practice seems to have fallen into disuse and to have been forgotten.

In 1774, **Faure** seems to have rediscovered the value of exposures to sun-light in the healing of suppurating wounds and ulcers, and later workers developed the practice of *photocauterization*, using glass lenses to concentrate the light. In 1845, **Bonnet** drew attention to the great value of heliotherapy in tuberculosis, applying both general and local treatment especially to tuberculous bones and joints. The therapeutic agencies appear to have been regarded as light and heat, but **Charcot**, in 1859, demonstrated that there was an action quite independent of the heating properties. In 1877, **Downes** and **Blunt** proved the bactericidal power of light; and **Widmar**, in 1889, showed that the ultra-violet region of the spectrum was responsible for the abiotic action.

The scientific application of light to the cure of disease may be said to date from the work of **Niels Ryberg Finsen**, of Copenhagen, whose first experiments were published in 1893. Of delicate constitution himself, he noticed that his vitality increased in the sunny weather, and his suspicions were confirmed by the behaviour of his cat, which made a habit of basking in the sun and following it round the courtyard through the day; the matter was clinched by the very definite improvement which his patients with lupus showed during the summer months,

and he began experimental work and clinical observations on a large scale. At the commencement he treated lupus with sun-light, concentrating it through lenses, first of glass, and later of quartz; finally he employed the carbon arc. His world-famous Institute was opened in Copenhagen in 1896. In 1899, Queen Alexandra, then Princess of Wales and President of the London Hospital, urged upon this hospital the advisability of adopting the methods of her countryman, and established there the first light-clinic for lupus in this country. In 1903, the year in which Finsen was presented with the Nobel Prize, **Rollier** started his sun clinic for tuberculosis in Leysin in the Vaudois Alps; and in 1908, **Gauvain** commenced his work on tuberculous children at Alton and Hayling Island.

From this time onwards the treatment of tuberculosis by light was well recognised; but in 1918, the observations of **Huldschinsky** on the beneficial effect of light in rickets, coming as they did in the period of war and distress in Central Europe, gave a new and economically important aspect to the subject. Since that time much attention has been given to the biological action of light, work which in this country has been largely directed by the Medical Research Council, which instituted a Committee for the purpose in 1922 under the chairmanship of Bayliss.

The application of light treatment to ophthalmic diseases seems to have begun with the practice of the photocautery. **Antonino Sciascia** described to the Italian Ophthalmological Congress at Palermo in 1892 how he treated wounds, lupus and trachoma by concentrating the sun's rays by a convex lens. The next year, **Tayer** of America, in 1894, **De Renzi** of Naples, and in 1895, **Kellog** of America, carried on the same practice. Meantime the Finsen treatment of lupus at Copenhagen was being directed to lupus of the lids, and for the last twenty years **Lundsgaard** has been extending the same principles to other ocular diseases. In Germany, in the early years of the century, **Birch-Hirschfeld** investigated experimentally the effects of light upon the eye, and since that time has employed it widely therapeutically. His work and that of others, are noted in the bibliography.

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Treated trachoma with an arc lamp cooled by a water filter; used bengal rose as a sensitizer as a subconjunctival injection; good results.

Angstein.—*Vide* Koeppe, S. 206, 1919.
Treated tuberculous disease with general light-baths (choroiditis, etc.); good results.

Arnold.—*Klin. Monatsbl. f. Augenheilk.*, Bd. LXXI, S. 219, 1923.
Used Birch-Hirschfeld's technique (*q.v.*) Treated ulcus serpens, rodent ulcer, catarrhal ulcer, tuberculous ulcer, keratitis filiformis, keratitis disciformis, and herpes corneae; results not uniform.

Ascher.—*Klin. Monatsbl. f. Augenheilk.*, Bd. LXVII, S. 622, 1921.
Used a mercury vapour lamp with a quartz director for local applications.

Aulamo.—*Acta Ophthal.*, Vol. IV, p. 480, 1926.
Treated ulcus serpens locally; good results.

Axmann.—*Deutsch. med. Wochenschr.*, Bd. XXXIII, Nr. 5, 1907.
General use in ophthalmology.

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General baths in irido-cyclitis (especially tuberculous), phlyctenular disease, tuberculous scleritis, sclerosing keratitis, etc.; Finsen's technique.

Birch-Hirschfeld.—100 *Versamm. deutsch. Naturforsch, u. Aerzte*, September, 1922; *Heidelberg, Ber.*, 1924; *Zeitschr. f. Augenheilk.*, Bd. LIII. S. 151, 1924; *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXVII, S. 184. 1926.
Used a Zeiss carbon arc with filtered light on a focusing apparatus locally. Treated ulcus serpens (190 cases), pannus ulcer (16 cases), eczematous ulcer (26 cases), episcleritis (6 cases), tuberculous iritis (2 cases), tuberculous keratitis (1 case), marginal ulcer (11 cases), rodent ulcer (1 case), herpes corneae (9 cases), parenchymatous keratitis (10 cases), traumatic infections (17 cases), late infections after trephine (2 cases). The results on the whole were good, and markedly so in ulcus serpens; here the percentage of failures was only 8.5.

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Treatment of ulcus serpens.

Denman.—*Jl. Ophthal., Otol. and Laryngol.*, Vol. XXX, p. 208, 1926.
Good results in trachoma, tuberculous conjunctivitis, corneal ulcers.

Duke-Elder.—*Brit. Med. Jl.*, Vol. I, p. 891, 1926; *Lancet*, Vol. I, pp. 1137, 1188, 1250; Vol. II, p. 16, 1926; *Trans. Ophthal. Soc. U.K.*, Vol. XLVI, p. 213, 1926; *Brit. Jl. of Ophthal.*, Vol. XI, p. 67, 1927.

Flaschenträger.—*Arch. f. Augenheilk.*, Bd. XCVI, S. 170, 1925.
Local treatment of ulcus serpens and episcleritis; good results.

Fleming u. Krusius.—*Deutsch. med. Wochenschr.*, S. 1600, 1911.
Treatment of tuberculosis, iritis, and irido-cyclitis.

Franke.—*Wiener. med. Wochenschr.*, May 11, 1907.
Good results in corneal lesions.

Gilbert.—*Klin. Monatsbl. f. Augenheilk.*, Bd. LXXIV. S. 781, 1925.
Using Birch-Hirschfeld's technique. Good results in tuberculous keratitis and scleritis, clearing of corneal opacities with improvement of vision, little good in parenchymatous keratitis, best in suppurative inflammation of the cornea, abolishing operative procedures and the use of caustics in ulcus serpens.

Goulden.—*Trans. Ophthal. Soc. U.K.*, Vol. XLVI, p. 207, 1926.
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Good results in ulcus serpens. Experiments on bactericidal action of light.

v. Hippel.—*Vide* Thedering: *Das Quartzlicht*, Oldenberg, 1923, S. 127.
Mercury vapour lamp gave good results in phlyctenular disease, irido-cyclitis, and tuberculous infection.

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Birch-Hirschfeld's local technique with carbon arc. Extremely good results with ulcus serpens; only 9 eyes lost in a series of 190 cases of all types. Also tuberculous keratitis, episcleritis, and herpes corneae.

Hunsel.—*Geneeskund. Tijdschr. v. Nederl.*, Nr. 6, 1911.
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Isaak.—*Westnik. Ophthal.*, Bd. XXX, S. 988, 1913-14.
Good results in trachoma.

Koeppe —*Arch. f. Ophthal.*, Bd. XCII, S. 115, 1916; *Diathermie u. Lichtbehandlung des Auges*, Leipzig, 1919, Vogel; *Münch. med. Wochenschr.*, Bd. LXVI, S. 743, 1920.
General baths to tuberculous patients. Local treatment by carbon arc heavily filtered down to employ rays from 3,500 to 5,000 A.U.: the so-called "blue light." Koeppe and others report good results with this, especially in tuberculous iritis, etc., which, however, are not borne out by all who have used the method. It is difficult to imagine that rays so long could have any great beneficial effect. It is also employed for the interior of the eye, that is, through the lens. This has already been commented upon as being dangerous, and (since the lens absorbs all the abiotically active elements) useless.

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Tuberculous iritis treated by mercury vapour lamp.

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Good results in local treatment of xanthelasma.

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General baths and local treatment, with the Finsen technique. Especially good results in local treatment of lupus and tuberculosis of the conjunctiva, all cases of which were eventually cured. General treatment especially in tuberculous subjects—keratitis, scleritis, dacryocystitis, iritis, and irido-cyclitis.

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Treatment of trachoma, vernal catarrh, and follicular conjunctivitis.

Mayer and Dworski.—*Amer. Review of Tuberculosis*, Vol. X, p. 146, 1924.
Experimental tuberculosis of rabbits; results of radiation.

Menacho.—*Ann. d'Ocul.*, T. CXL, p. 150, 1908.
Good results in vitreous haemorrhages; no useful results in corneal opacities.

Mohr u. Baumm.—*Klin. Monatsbl. f. Augenheilk.*, Bd. XLIX, S. 629, 1911.
Good results in trachoma treated locally by a Kromayer mercury. vapour lamp and a prism compressor. Radiation pushed to the formation of a pseudo-membrane.

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Nutt.—*Brit. Jl. of Ophthal.*, Vol. X, p. 138, 1926.
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Poyales.—*Arch. de Oftal. Hisp.-Amer.*, Vol. XXV, p. 555, 1925.
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Corneal and conjunctival conditions treated.

Schanz.—*Arch. f. Ophthal.*, Bd. LXXXVI, SS. 549, 568, 1913; *Münch. med. Wochenschr.*, Bd. LIV, S. 525, 1917; *Zeitschr. f. Augenheilk.*, Bd. XXXVI, S. 101, 1918; *Klin. Wochenschr.*, S. 2568, 1922; *Deutsch. Ophthal. Gesell.*, Jena, S. 229, 1922; *Münch. med. Wochenschr.*, Bd. LXIX, S. 1341, 1922.
Local treatment. Good results in corneal ulcers, especially pneumococcal, old opacities and deep infiltrates. Also eczema of lids and tuberculous iritis.

Schenck—*Homeopath. Eye, Ear, and Throat Jl.*, October, 1907.
Good results in iritis and chronic glaucoma.

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Local treatment using optochin as sensitizer against pneumococcus.

Seefelder.—*Heidelberger Ber.*, S. 243, 1920.
Treatment of conjunctivitis.

Seidel.—*Arch. f. Ophthal.*, Bd. XCIII, S. 357, 1917.
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Stein.—*Klin. Monatsbl. f. Augenheilk.*, Bd. LXXVII, S. 203, 1926.
General sun-baths for tuberculous infections and their sequelae.

Stock.—*Klin. Monatsbl. f. Augenheilk.*, Bd. LXXVI, S. 542, 1926; *Med. Klin.*, S. 1834, 1926.
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Corneal infiltrates and opacities treated with iron arc and quartz lens.

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Tuberculous conjunctivitis and lupus treated locally with good results.

AN ACCOMMODATIVE BALANCE TEST

BY

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I AM indebted to Mr. Clifford Browne's ingenious and attractive Duochrome Test for the estimation of refraction in distant vision for suggesting in principle the following counterpart for near vision, which, however, is not a "punctum proximum" test, or even a refraction test. It consists of two tiny rectangles of paper, red and green respectively, one close above the other, with a little black lettering on each, and mounted either on the middle of a black disc in an ordinary trial-lens ring, or on any punctum

proximum measure. I have to thank Messrs. Theodore Hamblin, Ltd. for supplying me with appropriate paper and mounts for the experiment. The little appliance, as figured, is obtainable from them.

There are two ways of using the test. The first consists in making it gradually recede until the letterings on the two papers appear equally vivid. This will generally be found to take place considerably further away than the punctum proximum. The second and more useful method is to hold the little device at the patient's reading or working distance, while plus spheres are mounted up on the top of his static refraction until the letterings agree.

Let us ask now what is the significance of this test. It is, I believe, the converse of the rod and wing tests, which measure the balance of convergence in the presence of a fixed accommodation, since it measures the *accommodative balance* in the presence of a known convergence. In each case the mental knowledge of the distance of the object plays a part also.

The first mode of applying the test, by which the disc is caused to recede until the letterings tally, tells us the distance of what for want of a better word I will temporarily call *synphoria,* a

condition in which the accommodative far point *tends*, at ease, to coincide with the point of intersection of the visual lines. The second (stationary) mode of applying the test tells us the accommodative phoria at the reading or working distance, a piece of information which ought to help us in the correction of presbyopia as soon as a sufficient number of experiments have been made.

It would be premature to make rules, at this stage, save only that when, at reading distance, the lettering on the red shows best, the presbyopic correction is too high. Thus, the red should be taken as a danger signal, while by how much the green should be allowed to predominate is a matter for investigation. The red indicates that the eye tends to be relatively myopic, and the green relatively hypermetropic, for the point of convergence.

The question: "Wherein exactly lies the difference between this new little test and the 'punctum proximum' test?" may be answered thus: The one is *effortless*, while the other demands the *maximum* of accommodative effort. On looking at the coloured papers the mind has no preference for one above the other, and accommodation simply "stands at ease" where it will. For the punctum proximum, on the contrary, the desire to see clearly under increasing difficulties is the provocation, and, as Duane says: "it is particularly important that the patient . . . . should accommodate with all his might." To put it shortly, one test measures the *balance* of accommodation, and the other its *amplitude*.

An interesting corollary of this little study is the sidelight it throws on the Clifford Browne distance test, showing that in theory it is not a pure refraction test, as has hitherto been supposed, however well it may work as such in practice. It is an "accommodative balance" test, and the *synphoric* point may or may not coincide with the punctum remotum, just as in the near test it never coincides with the punctum proximum. Happily, in far vision the coincidence is generally near enough for all practical purposes, and I use it, in the modified form of the Hamblin 2-colour distance test types, with much satisfaction. It is quite possible, however, that we may come across cases of incoincidence in which the 2-colour test result differs a little from Snellen's types.

CASES OF OPHTHALMOLOGICAL AND NEUROLOGICAL INTEREST

BY

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IT has long been recognized that ophthalmology and neurology touch each other at many points. I think the following cases illustrate this intimate relationship in a somewhat striking manner and that for this reason they are worthy of record.

The first case is that of a member of our own profession, aged 50 years, whom I saw in February, 1919, with Dr. Randall, of Wimbledon. When I saw him he was apparently quite unconscious although he told me afterwards that he had a vague recollection of seeing me. His eyes were partially open, there was well-marked ptosis on the left side, and there was squinting with external deviation of the left eye. His optic discs were normal and all his reflexes were normal.

I got from him some months later his history. On Christmas night of 1918 he had a violent attack of diarrhoea and vomiting. He had not felt well all day and had eaten sparingly so that the attack was not the result of any dietetic error or excess. After this he experienced vague pains and a sensation as if his head were being drawn downwards and forwards. There was double vision for two or three weeks before he eventually had to take to bed, and he also experienced vague blue mists at this time. He engaged a *locum tenens*, and the next day he became unconscious and remained for some time in the condition in which he was when I saw him. We concluded that it was a case of encephalitis lethargica and the subsequent course proved this to be correct. He recovered and was able to resume his practice but when I saw him a few months later he exhibited a marked condition of the Parkinsonian sequel to encephalitis lethargica. His ocular movements were good except that upward movements of both eyes were restricted.

The next case is that of a man, aged 58 years, whom I saw with Dr. Swayne on April 11, 1924. The only matter of significance in his previous health was that in 1893 he had had an attack of enteric in which he was said to have nearly died. Three or four weeks before I saw him he had had a febrile attack with sleeplessness, restlessness, and delirium. He had a sore throat and found one morning that he had diplopia. This lasted for eight or ten days and then passed off. He had one attack of sickness. Dr. Swayne did not see him until the feverish attack had passed off. When I saw him he felt weak and could not walk more than half

a mile. His taste and smell were defective and he was always sleepy. There was no headache, his reflexes were normal, and his ocular movements were good with punctuation on external deviation. There was no diplopia. I saw him on two occasions later, on May 24 and September 24. He had been away and had been resting, was better while away but the tiredness returned when he resumed work. He was seen by an ophthalmic surgeon who suggested intracranial growth but he never had anything to indicate definitely such a condition. He gradually became weaker, developed signs of bulbar involvement and died about eight months after I first saw him. I think this also was a case of encephalitis lethargica.

The next case is that of a lady, aged 46 years, whose history was difficult to obtain. I saw her in April, 1920, on account of headache and giddiness. Two and a half years before this she had had "dazzlings"—apparently ocular sensations associated with giddiness. In 1919 she had some teeth out and had five injections of some vaccine. She felt very ill after them and had a fit in May, 1919, in which she dislocated her shoulder—not an unusual effect of an epileptic fit. She also had an attack of shingles, and I may mention, incidentally, that within a week or two her daughter had chicken-pox. When I saw her she had double papilloedema, some headache and a history of recent vomiting. I was told that her blood and cerebro-spinal fluid had been examined, but I could not find out if a Wassermann had been done. A skiagram of her skull was negative. She was seen by another neurologist who strongly urged decompression, a procedure to which I demurred, and it was finally arranged that an ophthalmic surgeon should see her and carefully observe the amount of swelling, and only if sight were definitely threatened recourse was to be had to decompression. She was seen and watched by Mr. Fisher, and the papilloedema gradually subsided. I saw her on October 6, 1924, and her vision was good, the discs although a little pale showed no swelling and her general health was excellent.

The next case is that of a young clergyman who was sent to me by Mr. Inman of Southsea on September 25, 1922. Three weeks previously he noticed that his sight was not quite as usual. A week later he saw Mr. Inman who found a central scotoma in each eye and impaired vision. His sinuses were examined and found normal, his Wassermann was negative, and his urine normal. A few days later a small haemorrhage was noticed at the edge of the right disc and slight papilloedema was present in each eye. He became rapidly worse. There was marked papilloedema when I saw him, with swelling of about 3D., and *no* perception of light. X-ray examination of the skull revealed

nothing abnormal and the opinion was expressed that it was a case of so-called retrobulbar neuritis and the hope was expressed that it might clear up. Within twenty-four hours he was able to recognize the presence of a candle. Mr. Collins saw him and agreed with the diagnosis. He was put on iodide, but it is significant perhaps that improvement had set in before he had taken the iodide. He made a complete recovery and when I saw him three years later, he looked in excellent health, had had no trouble with his eyes, his vision was good, although his optic discs were pale. I have recently (February 23, 1928) had a report from him that he has remained quite well.

The next case is one which I venture to think contains lessons for ophthalmic surgeons as well as neurologists. In April, 1921, a boy, aged 11½ years, was brought to me by Dr. Gibson, with the history that he had suffered from headaches in the previous term at a preparatory school at Eastbourne. He was not a particularly clever boy, but he was sturdy and strong looking, and was not inclined to make too much of his headaches. He had not had any sickness. The day before I saw him he had seen an eminent ophthalmic surgeon who after examining his eyes had sent him on to an equally eminent neurologist—who, it seems to me on quite insufficient evidence, had boldly diagnosed intracranial growth and told an anxious mother that her boy was suffering from "the most incurable of all diseases—a growth in the brain." On examining the boy I found he had very red discs—and in the absence of any other signs of intracranial trouble, I formed the opinion that the condition was a physiological one—a so-called hypermetropic disc, although there was no hypermetropia.

A month later I wished his mother to take him to see the ophthalmic surgeon who had seen him before, but she declined to do this, and Mr. Treacher Collins saw him and agreed that the condition was not pathological. I may mention that the boy has remained well ever since and has pursued his career at a public school.

I have had a letter this month (Feb. 1928) from his doctor to say that he has recently seen him on account of a slight football accident and he has remained perfectly well in the meantime.

ANNOTATION

The Care of the Blind in Scotland

The Scottish Advisory Committee on the Welfare of the Blind has just issued its fourth report covering the years 1926-1927. They note that progress in the administration of the Blind Persons Act is being well maintained. Further, that there are certain areas in Scotland from which appeals are seldom received by the Board in connection with claims to pensions under this Act, and that these areas are those in which the arrangements of Outdoor Societies for the medical certification of blind persons are most efficient and where close co-operation exists between the Societies and the Pension Officers in regard to certificates of blindness. Grants-in-aid to valuable training institutes have been made by certain local authorities. Thus the combination of councils in the south-west of Scotland has incurred expenditure amounting to about £25,000 in the purchase and equipment of a factory in the Possilpark district of Glasgow as an extension of the Royal Glasgow Asylum for the Blind.

The Central Register of the Blind shows a steady, though not a large, increase. This is in the main due to the more active interest taken in blind matters by local authorities, the increased activity of voluntary agencies, and the granting of old-age pensions to the blind.

The decrease, mentioned in the last Report in the number of children of and under school age, we are pleased to note, has been maintained. The Committee express their belief that this decrease is due to a considerable extent to the measures adopted by local authorities for the prevention and treatment of disease, particularly the measures taken for the prevention and treatment of ophthalmia neonatorum and venereal diseases, and the extending provision made under maternity and child welfare schemes. In a Utopia of the future we feel that blindness at the school age will be an indictable offence.

The Report deals with methods of technical education, the possible absorption of the blind into various industries, and their treatment in other countries: it does not favour the compulsory notification of blindness. It is a business-like document and gives an account of a well-organized system.

INTERNATIONAL CONGRESS OF OPHTHALMOLOGY TO BE HELD IN AMSTERDAM AND THE HAGUE, September 5th—13th, 1929.

Subjects of Discussion which have been arranged and Names of Reporters.

SUBJECTS.	OPENERS.	DOMICILE.
1. Geographical distribution of, and international campaign against trachoma.	ARGAÑARAZ.	Buenos Aires.
	GRÖNHOLM.	Helsingfors.
	VON GROSS.	Budapest.
Dr. Wibaut of Amsterdam will exhibit and discuss the map of the World, showing the distribution of trachoma.	MAGGIORE.	Sassari.
	MIJASHITA.	Tokio.
	SOBHY BEY.	Cairo.
	SORIA.	Barcelona.
2. The aetiology and non-operative treatment of glaucoma.	DUKE-ELDER.	London.
	HAGEN.	Oslo.
	MAGITOT.	Paris.
	WESSELY.	Munich.
3. Diagnosis of supra-sellar tumours.	CHRISTIANSEN.	Copenhagen.
	CUSHING.	Boston.
	HOLMES.	London.
	VAN BOGAERT.	Antwerp.

Committees have been appointed to prepare Reports on the following subjects:	MEMBERS.	
a. Determination of visual acuity.	DUFOUR.	Nancy.
	ELSCHNIG.	Prague.
b. Perimetry.	LAUBER.	Vienna.
	PETER.	Philadelphia.
	TRAQUAIR.	Edinburgh.
c. Notation of the cylinder axis.	MARQUEZ.	Madrid.
	NORDENSON.	Upsala.
d. Examination of light sense.	HERTEL.	Leipzig.
	OVIO.	Padua.
e. Standardization of the visual examination of railwaymen, motor-drivers, seamen, and airmen.	ENGELKING.	Freiburg i/Br.
	MCMULLEN.	London.
	ONFRAY.	Paris.
	VERREY.	Lausanne.
f. Uniformity in the programme of ophthalmological studies.	LINDNER.	Vienna.
	PARKER.	Detroit.

ABSTRACTS

I.—DISEASE OF CONJUNCTIVA

(1) **Narog, François (Lwow, Poland).—A contribution to the pathology of xerosis of the conjunctiva and cornea, and of kerato-malacia. (Contribution à la pathologie du xerosis conjunctival et cornéen, et de la keratomalacie.)** *Arch. d'Ophtal.*, January, 1928.

(1) Believing that conjunctival and corneal xerosis and kerato-malacia have not been hitherto studied by means of the slit-lamp, **Narog** deems it useful to publish the results of his observations. He holds that the demonstration by means of the slit-lamp of crystals of cholesterine in epithelial xerosis of the conjunctiva and parenchymatous xerosis of the cornea, is a sufficiently novel phenomenon to merit attention. He considers epithelial xerosis and kerato-malacia, with the disintegration of tissues which follows, as a series of local degenerative processes due to general lack of vitamines (*l'avitaminose*).

The author records at some length, clinical and pathological notes concerning seven cases, with three illustrations. He expresses the opinion that the information derived from our present knowledge of vitamines and from the microscopic and slit-lamp examinations throws fresh light on the pathogenesis of these affections. The lamp has demonstrated vacuoles, evidencing serous degeneration, crystals and masses of desquamated epithelium resulting from destruction of epithelial tissue. In relation to aetiology the writer distinguishes between local xerosis due to disease of the eye, and symptomatic xerosis dependent upon a general disorder. The former is seen in dystrophic conditions of the conjunctiva, as a sequel of trachoma or pemphigus, or prolonged exposure of the eye from inability to close the lids. The nature of symptomatic epithelial xerosis associated with a general morbid condition is still obscure. It is, however, known that it is induced by debility and malnutrition. It manifests itself at the nasal and temporal margins of the cornea in the form of white patches covered by a fine dry froth, which is not moistened by the tears: it is accompanied by hemeralopia. Narog proposes to divide cases of symptomatic xerosis into two groups: simple epithelial xerosis situated at the margins, and sometimes called Bitot's patches, and the more severe form of diffuse epithelial xerosis, degenerative and desquamative, characterized by dryness of the whole ocular conjunctiva, by extensive desquamation especially above and below the cornea, and by a brownish tint of

the conjunctiva, and atrophy of the fatty tissues. In both forms epithelial desquamation and cholesterine crystals are characteristic signs.

After reference to a number of earlier papers on this subject, especially in relation to the more severe types, the author formulates the following conclusions:

(1) Xerosis of the conjunctiva and kerato-malacia are not caused by specific micro-organisms. They are due to lack of vitamines which manifests itself by exhaustion of the reserves of adipose tissue, by regressive processes, *e.g.*, serous and hyaline degeneration, and necrosis of cells. The secretory functions of the epithelium fail; the lacrymal glands become atrophic and their secretion altered; the fat in the tissues undergoes resolution.

(2) As a product of the destruction of cells and solution of fixed fat, crystals of cholesterine are found in the epithelium, where they are visible by the slit-lamp.

(3) In severe cases the whole ocular conjunctiva becomes xerotic, resulting in widespread desquamation of epithelium which is found in masses above and below the cornea

(4) Hemeralopia is the first evidence; conjunctival xerosis follows this symptom closely.

(5) Kerato-malacia of childhood is most common during the first year of life. It may be caused by syphilis, tubercle, chronic enteritis, infectious maladies and malnutrition, as well as by lack of vitamine A. It is of rare occurrence in adults, but may result from general exhaustion most frequently following jaundice and disease of the liver caused by lack of vitamine A. It is often preceded by hemeralopia and conjunctival xerosis.

(6) When insufficiency of vitamines is of long duration, assimilation of fat is arrested and aged patients may be attacked (in addition to xerosis of the conjunctiva and hemeralopia) by typical hyaline degeneration of the corneal epithelium.

(7) When recovery from xerosis begins the conjunctiva is the first structure to manifest improvement. Hemeralopia usually disappears before the xerosis has fully recovered: but in severe cases it is the last symptom to pass.

(8) In parenchymatous xerosis of local origin the trophic and cicatricial lesions at times give rise to serous degeneration and the appearance of crystals in the thickened epithelium; on the other hand, destruction of the cornea does not occur. A bibliography containing twenty-four references is appended.

J. B. LAWFORD.

(2) **McKee, S. Hanford.—Parinaud's conjunctivitis with suppuration in the preauricular, submaxillary and supraclavicular glands.** *The Can. Med. Assoc. Jl.*, August, 1927.

(2) **McKee's** article opens with an interesting historical résumé of the disease. The first description of a case would seem to have been made by Goldzieher under the title of lymphadenitis conjunctivae in the *Centralblatt* for November, 1882. Parinaud's account was given in 1889, before the Ophthalmological Society of Paris. He described three cases, stated that suppuration of the gland was an essential feature of the disease, and was inclined to attribute it to animal infection, since the second of his cases was a butcher's wife, and the third, a child of five years old lived in a one-storied house where there was a meat shop. Verhoeff in 1913 described a minute filamentous micro-organism (a leptothrix) in eleven out of twelve consecutive cases. Animal inoculations and cultures were negative. The author's case occurred in a medical man who had, on one side, swollen lids and enlarged preauricular, cervical and submaxillary glands. The conjunctiva was intensely inflamed, and there was comparatively little discharge. In the fornix, there were a number of greyish yellow areas beneath the epithelium. A piece of the conjunctiva was examined microscopically by Verhoeff's method with a negative result. Frequently fields were seen wherein it was thought that leptothrices were present, but closer examination showed them to be degenerated elastic fibres. The author of this abstract has had a similar experience. A boy at St. Mary's Hospital was thought to have Parinaud's conjunctivitis. He developed an enlarged preauricular gland which became fluctuant and was aspirated. The contents were both cultured and injected into a guinea-pig with negative results. A part of the conjunctiva was removed and examined by Verhoeff's method. The result was to produce partial staining of the elastic fibres and an appearance resembling leptothrices. The gland enlarged again after aspiration, so it was dissected out and removed. A portion of the removed gland was again injected into a guinea-pig and produced tubercle.

F. A. WILLIAMSON-NOBLE.

(3) **Fox, N., and Deutsch, E. (Chicago).—Chronic conjunctivitis and nasal infection.** *Amer. Jl. of Ophthal.*, October, 1927.

(3) **Fox** and **Deutsch** were struck "by the frequency with which nasal pathology is found in individuals suffering from both acute and chronic diseases of the conjunctiva." Magitot, for example, found in a series of 100 cases, that 30 per cent. were associated with acute coryza, 5 per cent. with non-luetic ozaena, 7 per cent. with lues, 13 per cent. with chronic sinusitis, and 15 per

cent. with deviation of the septum. The present authors concerned themselves with 35 cases of conjunctivitis of over two months' duration, or where there had been more than one recurrence. The most brilliant results were obtained in those with low deviation of the septum, vomer spurs, and infected suppurating adenoids in children. There are four different ways in which the infection may travel: (1) by propulsion of infected material from the inferior meatus up the lacrymal passages during blowing of the nose; (2) by direct extension along the mucosa; (3) by the lymphatic and venous channels of the canal; (4) by reflex irritation of the conjunctival vaso-motor system through nasal irritation. Bacteriological examination of most cases is negative or is of no aetiological significance. The paper concludes with details of cases successfully treated. Thus, one case of follicular conjunctivitis in a child cleared up on removal of tonsils and adenoids; one of chronic catarrhal conjunctivitis in a woman, associated with rhinitis, cleared up after cauterization of the inferior turbinate, use of a nasal spray, and transference to a dry climate; one of chronic calcareous granular conjunctivitis cleared up after removal of a deviated septum and an exostosis, and use of an albolene spray.

F. A. WILLIAMSON-NOBLE.

(4) **Piotrowski, G., and Frydmann, Mlle. (Geneva.)—Metastatic gonococcal conjunctivitis. Efficacy of protein therapy in a case of conjunctivitis, probably of metastatic gonorrhoeal origin. (Conjonctivite gonococcique métastatique. Efficacité de la protéinothérapie dans un cas de conjonctivite probablement d'origine gonococcique métastatique.)** *Rev. gén. d'Ophtal.*, June, 1927.

(4) The full title of the article by **Piotrowski** and **Frydmann** nearly suffices as an abstract of the case which they report. A man, aged 24 years, who had an untreated urethritis, and a severe conjunctivitis resembling that due to the pneumococcus did not show either in the urethral or ocular secretion any samples of the gonococcus, nor was there conjunctival pneumococcus. Nevertheless a "gonoreaction" carried out by Starobinski proved strongly positive. The disease rapidly subsided under the influence of anti-gonococcic vaccine. By means of a gonococcal toxin prepared by Starobinski an attempt was made to reproduce in rabbits the ocular phenomena, particularly the haemorrhages which had been a feature of the case. The results were "absolutely negative." The authors seem to have been eventually satisfied with the diagnosis made, although one can quite see the reason for an early suspicion of theirs that "it might be a simple coincidence."

ERNEST THOMSON.

(5) **Rao, Narayana B. K. (Bangalore, India).—Conjunctivitis vernalis or spring catarrh of the conjunctiva.** *Indian Med. Gaz.*, January, 1928.

(5) This report gives the results of a comprehensive systemic examination of seven patients suffering from spring catarrh, under observation for periods of a few weeks or months. This investigation was supplemented by ordinary clinical examination of ten patients seen later. All but one of the seventeen patients were adolescent males. Itching of the eyes was more or less constant, nearly always with photophobia and a tendency to sneezing. Slight dusky colouration of the conjunctiva was noted in some of the bulbar cases; it is said to have resembled that seen in natives of India affected with epithelial xerosis. (The distribution of the pigment is, however, quite different in the two affections. A good photograph of the spring catarrh pigmentation is reproduced in Elliot's "Tropical Ophthalmology," p. 319.)

For diagnosis the presence of numerous eosinophiles in the discharge was relied upon. And some patients with similar symptoms, but without this finding, were excluded from the list. They are being studied still as possibly transitional, or early cases of the disease. In the question of diagnosis no mention is made of the invariable absence of elevations from the retrotarsal folds and fornices (see *Brit. Med. Jl.*, Vol. II, p. 1233, 1907).

It is suggested that perhaps the key to the proper understanding of the disease lies in a complete knowledge of the origin, function, and fate of the eosinophile leucocyte in the blood. Seventeen years ago **Rao** studied the leucocyte count of nearly a hundred students of the Madras Medical College, and was surprised to find eosinophilia of 10, 15, or 20 per cent. in a few apparently healthy students, free from the commonly recognized causes of this abnormality.

Among the seven patients now exhaustively examined, the eosinophiles at first varied from 9 per cent. to 25 per cent. of the total white corpuscles, though later they were reduced in number. There was no leucocytosis, and no increase in the coagulation time of the blood. Lymphocytosis was observed in some. The patients were all reported to be free from other conditions likely to account for the blood change, such as worms, intestinal or other toxaemias, etc. All but one had some abnormal state of the nose or throat.

Since it has been considered that calcium deficiency may be a cause of the complaint, calcium lactate, 10-15 grains, was administered thrice daily, and injections of nuclein were given twice daily with the idea of producing leucocytosis. Great improvement is said to have followed in all the patients.

H. HERBERT.

(6) **Jean-Sédan.—Contribution to the study of conjunctival circulation; subconjunctival migration of Chinese ink during five years. (Contribution à l'étude de la circulation conjonctivale; migration sous-conjonctivale d'encre de Chine, ayant duré cinq ans.)** *Ann. d'Ocul.*, Vol. CLXIII, p. 600, 1926.

(6) **Jean-Sédan** states that he reported in 1923 the case of a boy who had implanted some Chinese ink into and beneath the conjunctiva of his right eye by an accident with a mapping-pen three years previously. In this period of three years the jet-black island of granules of ink had migrated close to the temporal side of the cornea at 9 o'clock from a position several millimetres further out. It had become broken up into more or less discrete spots of *brown* colour of which some were movable with the conjunctiva and some fixed to the sclerotic. In 1926 the brown mark at 9 o'clock had disappeared, and a streak of colour composed of brownish dots was found at 7 o'clock and another at 11 o'clock. These were entirely deep to the conjunctiva which was freely movable over them. Under high magnification with the corneal microscope, the granules of ink appeared to have separated themselves from the vessels the further the migration had extended. A different finding was made by Gabriélidès (*Arch. d'Ophtal.*, 1911) in the case of conjunctival pigmentation in argyrosis, in which, as confirmed by histological examination, the pigment was in the walls and along elastic fibres near the vessels. In a solitary reported case of subconjunctival inoculation of Chinese ink no change of position was noted in the course of five years. Reference is made to various writers on the subject of the migration of pigment after corneal tattooing, and a bibliography is given.

HUMPHREY NEAME.

(7) **Gérard, G., and Morel, J. (Lille).—Adenoma of the conjunctiva containing Meibomian glands. (Adénome de la conjonctive renfermant des glandes de Meibomius.)** *La Clin. Ophtal.*, July, 1927.

(7) This curious case concerned a man, aged 24 years, who, at that age, discovered for the first time, when washing his face before a glass, a small white tumour presenting between the eyelids in the outer half of the palpebral fissure. He contrived, before the glass, to cause the "large fleshy pea," as he called it, to reappear by directing the eye downwards and inwards. The tumour was snipped off later by **Gérard**, who found that it contained Meibomian gland tissue and concluded that it had been formed as a result of foetal inclusion and that therefore it had been present all the life of the patient, evolving so slowly that it had never

attracted attention until it prolapsed between the lids. One would have thought that a tumour, large as a pea, could hardly remain unnoticed, but the authors make the statement that it was neither visible as a prominence under the upper lid nor even palpable. On closure of the eyelids the soft tumour was retained upwards and outwards by its pedicle and became lodged under the palpebral lacrymal gland quite high up against the fornix. The article is accompanied by a sketch of the patient, holding his upper lid upwards and outwards, before and after the operation but unfortunately the reproduction is so poor that for practical purposes the illustration might have been omitted. Two other drawings illustrate the histological findings quite well.

ERNEST THOMSON.

(8) **Lyritzas, D. (Athens).—A contribution to the therapy of pterygium. (Beitrag zur Therapie des Pterygium.)** *Arch. f. Augenheilk.*, Vol. XCVIII, May, 1927.

(8) **Lyritzas's** operation consists in introducing a moderate-sized sound under the neck of the pterygium and by sawing movements uprooting the growth from the cornea. Then the whole of the conjunctiva involved by the pterygium is removed by making two convergent incisions in the conjunctiva to meet at the caruncle and undermining. The edges of the conjunctiva on either side of the gap are brought together with two or three stitches, undermining if necessary. It is hardly ever that a transplant from the healthy bulbar conjunctiva is needed to cover the gap. The advantages claimed for the operation are: (1) It leaves no degenerate tissue behind (as in the usual procedure of separating the pterygium from the cornea by cutting with the lancet or Graefe knife and burying or severing only a part of the diseased conjunctiva) thus making recurrence impossible; (2) the affected part of the cornea recovers its transparency.

D. V. GIRI.

(9) **Noguchi, Dr. Hideyo (New York).—Chronic granular conjunctivitis induced in macacus rhesus and chimpanzee by inoculation of cultures of a microorganism isolated from cases of American Indian trachoma.** *Arch. of Ophthal.*, September, 1927.

(9) **Noguchi** describes in this article some experiments he has made with an organism isolated from five cases of trachoma in the Albuquerque Indian School. The organism is a minute Gram-negative pleomorphic bacillus, motile only under certain conditions. It grows best on a semi-solid medium containing fresh animal serum and haemoglobin and it will not grow on any of the ordinary culture media and only occasionally on blood agar. Other

organisms, staphylococcus, b. xerosis, and sarcina were also found, but proved on inoculation into monkeys not to produce trachoma. The results were entirely different, however, with the newly-discovered organism. Twelve monkeys received a conjunctival inoculation and eight developed a slowly progressive chronic granular conjunctivitis, resembling trachoma in the localization and character of the lesions. Three of the monkeys developed lesions which remained for a short time and then receded, while in only one monkey was the inoculation entirely negative. The lesions induced in the conjunctiva by means of the cultures were directly transmitted to normal monkeys in several instances. Histologically, the lesions bear a close resemblance to those in human trachoma.

The only striking difference is that monkeys possess no adenoid layer and no papillae comparable with those in the human conjunctiva. Hence papillary hyperplasia is absent. Nevertheless, wherever there occurs sufficient loose subconjunctival tissue, one finds typical lymphoid infiltration and follicle formation. Noguchi's discovery is of great importance, since this is the first occasion on which anyone has produced trachoma with pure bacteria.

F. A. WILLIAMSON-NOBLE.

(10) **Worms and Bidault (Paris).—Treatment of trachoma by diathermy. (Le traitement du trachome par la diathermie.)** *Rev. Internat. du Trachome,* October, 1927.

(10) At a meeting of the Société d'Ophtalmologie de Paris in December, 1924, **Worms** and **Bidault** drew attention to the use of high-frequency currents in the treatment of trachoma, and later showed cases treated in this way.

The apparatus used is that of Drapier, which is furnished with special electrodes; other kinds of apparatus may be satisfactory, especially that of Walther. The patient sits in a metallic chair, covered with American cloth, to which one of the poles is connected. The active electrode consists in a straight or curved metallic point set in an ebony handle; or it may take the form of a bead 2 mm. or 3 mm. in diameter. Effective local anaesthesia is obtained by instillations of 5 per cent. cocaine, and subconjunctival injections of novocaine. The use of adrenaline is avoided. The active electrode is applied to the everted palpebral conjunctiva, and the current is passed for one or two seconds: the electrode is removed and reapplied at another place: ten or twelve such applications are made at each séance, the current employed being from 100 to 200 milliampères.

The reaction produced by the procedure is variable, such as pain and oedema, but it is never an obstacle to treatment. If ten

or twelve spots of the conjunctiva have been touched in this way the thermic effect makes itself felt throughout the whole extent of the conjunctiva of the lid treated. The process is one of cellular coagulation, and this is succeeded by the formation of a new tissue of a fibro-conjunctival nature. A smooth whitish surface is left, rather shiny, with some fine white lines of cicatrization. The treatment is repeated at intervals of six or eight days: it is rarely that the reaction is so severe that a longer interval has to be allowed.

The stages of trachoma which are especially benefited by diathermy-coagulation are trachoma II*a*, and trachoma II*b*. In other stages no great benefit is to be expected. In conclusion the authors state that the treatment, prudently carried out, is without danger.

A. F. MACCALLAN.

(11) **De Peyrelongue (Beyrouth).—Frequency, clinical forms, aetiological factors, and geographical distribution of trachoma in Syria and Lebanon. (Fréquence, formes cliniques, facteurs étiologiques et distribution géographique de trachome en Syrie et au Liban.)** *Rev. Internat. du Trachome*, October, 1927.

(11) **Peyrelongue's** domicile in Syria enables him to observe the extent of the emigration from Syria and the Lebanon to Europe of natives who are to a considerable degree infected with trachoma. He also describes the heavy tribute which French troops and officials pay to this disease. Among ophthalmic out-patients 59 per cent. are trachomatous.

A. F. MACCALLAN.

(12) **Morax, V. (Paris).—Trachome unilateral de l'adulte. Traitement par l'huile de Chaulmoogra.**

Gabrielides, G. (Athens). — Traitement du trachome par l'huile de Chaulmoogra. *Rev. Internat. du Trachome*, July, 1927.

(12) Treatment of trachoma by Chaulmoogra oil was first tried by Madame Delanoe in Morocco. Both **Morax** and **Gabrielides** have found it to be of value. The method of employment is as follows: novocaine anaesthesia; scarification of the conjunctiva of the everted lid (Gabrielides used no scarification); methodical friction, using some force, with a tampon of cotton wool steeped in Chaulmoogra oil which has been liquefied by warming on the end of a glass rod; instillations of a solution of copper sulphate 2 per cent. This treatment is almost painless as compared with the usual methods.

A. F. MACCALLAN.

II.—GLAUCOMA

(1) **Davies, D. Leighton (Cardiff).—Chronic Glaucoma.** *Lancet, April 7, 1928.*

(1) The article by **Davies** is obviously written in order to put the general practitioner on his guard against the insidious form of glaucoma. It contains but little which need be summarized for the specialist beyond the statistical results of operation, and of operation, mainly at any rate, by trephining. In 155 consecutive cases seen in private practice 79 were males and 76 females, and their ages ranged from 50 to 86 years, nine cases being below the age of 50 years, the youngest being aged 26 years. In 100 private cases of chronic glaucoma operated upon the patient's sight was retained in 91. The failures were as follow: Suppuration twenty-four hours after operation, 1 case; septic irido-cyclitis (one year after), 1 case; intra-ocular haemorrhage, 2 cases; inefficient operation (trephine hole blocked), 2 cases; chronic irido-cyclitis starting after operation, 1 case; cataract soon after operation, 1 case; gradual loss of sight due to progressive atrophy of the nerve, 1 case. In a few cases cataract developed some years after trephining, and in two or three of these subsequent extraction led to a return of ability to read easily. The author summarizes in the following words: "In the modern operation of trephining we have a method which in about 90 per cent. of cases will ensure a permanent cure for glaucoma; while it cannot restore sight lost it can prevent further deterioration, and therefore it is always wise to operate as early as possible. At the same time, in a few cases it may be justifiable and wiser to wait, trusting to general hygiene and the wise ordering of the patient's method of living, together with the use of eserine. The large majority will ultimately lose sight unless operation is undertaken. The future may, and possibly will, bring an advance in our knowledge of the pathogenesis of the disease, and other methods may become available, but to-day to place our confidence on any other method than operation is to risk the loss of sight which might have been saved."

NOTE.—In the *Lancet* for the following week, April 14, there is an annotation, one object of which appears to be to indicate that Davies had rather minimized the value of eserine. This certainly was also the opinion of the reviewer, for the word eserine appears only once in the two columns of print as follows: "At the same time, in a few cases it may be justifiable to wait, trusting to general hygiene and the wise ordering of the patient's method of living, together with the use of eserine." Nevertheless, assuming that the article was written for the guidance of the general practitioner, it

may have been wise not to encourage the latter in the prolonged use of eserine. Certainly, a general practitioner who diagnoses chronic glaucoma, and treats it with eserine without saying anything about operation or referring the case to a specialist, runs some risk of getting into trouble with his patient.

ERNEST THOMSON.

(2) **Bryd, Hiram (Bradenton, Fla.)—The relation of the nasal ganglion to glaucoma.** *Arch. of Ophthal.*, March, 1927.

(2) The basis of **Bryd's** paper is an observation by Lagrange that "in glaucoma, there is a neuropathy producing a hypersecretion, as first postulated by Donders, leading to increased tension when, as shown by Knies, the anterior chamber angle becomes blocked." Magitot has shown that with a canula in the anterior chamber, the normal intra-ocular pressure in cats is 30 mm. Hg. If the canula be allowed to touch the iris, however, the tension in three minutes amounts to 42 mm. and in seven minutes to 56 mm. "Pathological currents" in the body may originate from a focus of infection and cause irritation *via* the nervous system in various structures, among which are the iris and ciliary body. The problem, therefore, is to intercept these currents, and so far as the eye is concerned, this can be done by blocking Meckel's ganglion. Details are given of several cases of acute glaucoma in which prompt relief followed cocainization of the ganglion, though the procedure had to be repeated when the effect of the drug wore off. This repetition was obviated in one case by subsequent injection of the ganglion with 7 minims of 95 per cent. alcohol with 5 per cent. carbolic acid. The author claims "that in no instance yet, has this method of attack been a failure, even when the pupil was dilated and bound down to the lens."

F. A. WILLIAMSON-NOBLE.

(3) **Gradle, H. S. (Chicago).—Conjunctival drain of the anterior chamber.** *Jl. Amer. Med. Assoc.*, December 10, 1927.

(3) The operation here described has been performed by **Gradle** in cases of absolute glaucoma. The conjunctiva is incised at the limbus in the upper 180 degrees. A double-armed number 0 black silk suture is then passed from below outward through the conjunctiva as near to the limbus as possible. With scissors a vertical incision is made upward on each side of the suture, thereby fashioning a tongue of conjunctiva 10 mm. long and 3 mm. broad, through the limbal end of which is the suture. The conjunctiva is retracted and a cyclodialysis is performed. Through the track made by the spatula in creating the cyclodialysis the

tongue of conjunctiva is introduced into the anterior chamber by passing the needles through the tunnel and out through the cornea as close as possible to the limbus, and tying the suture over a tiny gold plate.

Twenty such operations have been performed since 1921. Four were unsuccessful and excision was required. Sixteen of the operations are called successful though in only one case did sub-conjunctival drainage occur.

The usefulness of the operation is described by the author as being an alternative to excision of the globe in cases of eyes in a condition of absolute glaucoma which are painful. It is not clear from the description given that all these eyes were painful at the time they were operated on: it is common experience that many absolutely glaucomatous eyes cause no pain.

A. F. MACCALLAN.

(4) **Gifford, S. R. (Omaha). — Iridencleisis with water-tight closure of the conjunctiva.** *Trans. Amer. Acad. of Ophthal. and Oto-Laryngol*, 1927.

(4) **Gifford** claims good results in cases of chronic simple glaucoma from the following operation. Preliminary instillation of eserine is not employed; the anaesthetic consists of a 2 per cent. solution of butyn; this avoids dilatation of the pupil. Two drops of a 2 per cent. solution of cocaine are injected over the superior rectus muscle, and the tendon is seized with a catch fixation forceps as far back as possible, at least 1 cm. from the limbus. A straight horizontal incision, of the same length as the width of the cornea, is made in the conjunctiva in front of the grip of the fixation forceps, and the conjunctiva is dissected up to the limbus, but the dissection is not carried into the corneal substance, as in the operation of trephining. Fixing the eye by the original forceps while an assistant holds up the flap, a narrow keratome is inserted in the sclera, 1.5 mm. behind the limbus, and pushed into the anterior chamber, making an incision of 4 mm. length. The iris is drawn out with iris forceps, and a vertical cut is made through the sphincter of the pupil and iris substance. One pillar is replaced by massage or repositor and the other is tucked down under the conjunctival flap. The conjunctival incision is closed by a running suture of silk, the stitches being placed fairly close together and extending well beyond each end of the incision. No knots are used, about 1 cm. of silk being left loose at each end of the suture after it has been pulled tight. Usually only a few drops of aqueous are lost and the anterior chamber, at the end of the operation, is hardly ever completely empty. The eye is dressed daily and the stitch removed after six days.

Twenty-one eyes have been treated on these lines during the past two and a half years, the tension being estimated by the tonometer. The stages of the operation are illustrated by three pictures.

R.R.J.

(5) **Jervey, J. W. (Greenville, South Carolina).—Sclero-post-iridectomy, a rational operation in glaucoma.** *Amer. Jl. of [Ophthal.*, January, 1928.

(5) **Jervey** describes a new and interesting operation for the relief of all forms of glaucoma except those with a deep anterior chamber. His object is to free the angle of the anterior chamber, and the technique is as follows: The conjunctiva is dissected down to the limbus as in the first step of trephining. A small, very sharp, belly-edged scalpel is then used to make an incision through the sclera, 3-5 mm. long, parallel with the limbus and 2.5 mm. above it. The incision is made by repeated strokes downward on the sclera. A bent iris repositor is inserted through the wound and insinuated between the sclera and iris base until its point is seen in the anterior chamber, when it is worked gently from side to side. The uveal tissue is now cut through along the line of the scleral incision by puncture and upward cutting with a cataract knife. A small bent blunt hook is then passed along the posterior surface of the iris, hugging it closely so as to avoid trauma to the lens capsule and when the hook presents in the pupillary area, it is made to engage the edge of the iris, which can be withdrawn upwards for performance of iridectomy. The conjunctival flap is replaced with two sutures. The author has so far performed the operation on 18-20 cases in the last five years. He gives no details of results, but he states that on the whole they have been more satisfactory than those obtained by any other method.

F. A. WILLIAMSON-NOBLE.

BOOK NOTICES

Annual Report of the Department of Health, Government of Palestine, 1926. Ophthalmic Service.

From 1919 to 1923 skilled treatment for persons requiring ophthalmic treatment in Palestine was provided by a single travelling ophthalmic hospital. In 1924, Colonel Heron, the Director of Health, was obliged to close this hospital owing to lack of funds. Then with the financial assistance of the British Order of St. John

in Jerusalem and with the technical advice and supervision of Dr. Strathearn, the head of the Order's Ophthalmic Hospital in Jerusalem, a number of Government Ophthalmic Clinics were established in various parts of the country. Government Medical Officers after some training were put in part-time charge of the six clinics. A trained nurse was attached to each to carry out ophthalmic work in the neighbouring schools, and with the personnel and material available the results have been very satisfactory. Nevertheless in the schools 62 per cent. of the pupils show signs of trachoma.

Thirteenth Annual Report of the Ophthalmic Section, Department of Public Health, Egypt, 1924-1925.

These reports, though somewhat belated, show that progress is maintained in the ophthalmic amelioration of Egypt. There are now 21 permanent hospitals in buildings, and 8 travelling hospitals under canvas. At each hospital there are usually two surgeons who are engaged exclusively in ophthalmic work.

Nearly a quarter of a million new patients are treated annually, of whom about half require operation either major or minor. More than three thousand cases of primary glaucoma were seen; there were also 4,645 cases of secondary glaucoma.

More than 25,000 patients came for treatment in 1925 who were blind in one or both eyes. Nevertheless the percentage of blindness among out-patients is now only about 10 per cent. as compared with about 15 per cent. in 1909.

For many years ophthalmic treatment has been carried out daily at the Government Primary Schools. In 1925 more than 8,000 pupils were examined of whom 91 per cent. exhibited signs of active or healed trachoma. As the result of continued treatment during the school year the worst cases (MacCallan's Stages of Trachoma 1 and 2) were reduced from 23 per cent. to 5 per cent.

Bulletin of the Ophthalmological Society of Egypt. Vol. XX, 1927.

The Ophthalmological Society of Egypt has now 110 ordinary members of whom 72 were present at the Annual Meeting. The *Bulletin* contains the papers read and extends to 220 pages. It is embellished by many admirable drawings, some of them coloured, which have been carried out by Dr. Haig, the pathologist of the Giza Memorial Ophthalmic Laboratory, for several authors. Papers by Meyerhof and Osborne on the History of Ophthalmology in Egypt were the subject of an article in the *British Journal of Ophthalmology* for December, 1927. This subject is brought up to date by Mazni, the present Director of the Egyptian Government

Ophthalmic Hospitals, who states that there are now 11 travelling hospitals and 23 permanent hospitals at work. He pays a graceful tribute to his predecessor, MacCallan, whose pupils in ophthalmology the majority present at the meeting had been.

Several of the papers have been abstracted for these columns; among others which do not lend themselves to abstraction are several by Sobhy. In one of them he reports a case of interstitial keratitis following an operation for primary chronic glaucoma; and in another a case of acute primary glaucoma in one eye associated with secondary glaucoma in the other due to thrombosis of the central vein. Galal Aboul Seoud reported 20 cases of uniocular trachoma. Y. Barrada reported two cases of the peroneal type of muscular atrophy associated with optic atrophy, in a brother and sister. Peretz has an interesting article on injuries to the eye in soda-water manufactories. M. A. Barrada gives the pathological report on a case of cystic globe.

Transactions of the American Ophthalmological Society. Vol. XXV, pp. 421. Philadelphia, 1927.

This volume of the *Transactions of the American Ophthalmological Society* is of exceptional interest. We would draw attention specially to Bedell's paper on macular holes with the accompanying photographs taken with the Nordenson camera and to the interesting and well-illustrated papers on Angioid Streaks by Holloway and Calhoun. We hope to publish extracts of the papers at a later date.

Amongst the obituary notices is one devoted to Dr. W. M. Sweet, whose name is familiar to most of us in connection with his work on the localization and treatment of intra-ocular foreign bodies.

The Committee on the Ophthalmic Year Book publish their report. In this they state that "if a large number of those immediately benefited would be willing to make some personal sacrifice to continue the publication, it was felt that an appeal to the Trustees of the Foundations would have at least a respectful hearing." They consider that if ophthalmologists will subscribe about 10,000 dollars a year for the next five years, or will subscribe 100,000 dollars to an endowment fund, the future of the Year Book will be assured.

OBITUARY

HIDEYO NOGUCHI

LIKE Walter Myers and Adrian Stokes, martyrs to science in the bacteriological investigation of yellow fever, HIDEYO NOGUCHI has died at Accra. He was born in Japan in 1876, and educated at Tokio University. He went to America in 1901, and after holding several posts became attached to the Rockefeller Institute. His bacteriological researches included the discovery of the spirochaeta pallida in the brain in general paralysis, and in the spinal cord in tabes. During the last ten years Noguchi did a great deal of work on yellow fever in Central and South America, and it was in order to determine whether or not his discovery of a spirochaete there could be repeated in Africa that he made his last voyage eastwards. He had intended to arrive in England on June 2, on his way to Egypt, where he hoped to correlate his bacteriological researches on trachoma among American Indians with further research on Egyptian trachoma.

He had succeeded in isolating from the trachomatous conjunctiva of man an organism which produced follicles followed by scarring when injected beneath the conjunctiva of chimpanzees. The organism was recovered from the follicles and cultured, when it again produced the same results on inoculation. The organism which he isolated was a Gram-negative, aerobic bacillus, possessed of motility. Blood serum from trachoma cases produced marked agglutination of the cultured bacilli, which was not the case with serum from non-trachomatous cases. The histological appearance of the trachoma among the Indians and the inoculated conjunctiva of chimpanzees differed from the histological appearance of trachoma as found in this country; and in emigrants to this country from Europe, as pointed out by Mayou. In Noguchi's original article on the subject (*Journal of the American Medical Association*, September 3, 1927), he said, "Whether or not the parasite is related to forms of trachoma other than that occurring among American Indians remains, of course, to be determined by isolation of the micro-organism from cases in other localities, and possibly also by serological examinations."

Noguchi is described by one who knew him, as "a very modest and retiring little chap but one of the salt of the earth."

One of the foremost in bacteriological research, he was persuaded by some American ophthalmic surgeons to interest himself in trachoma. His work on this disease was not completed, and his loss is incalculable.

"This high man, with a great thing to pursue,
Dies ere he knows it."

As this notice is going to press we regret to read of the death of Noguchi's assistant, Dr. W. A. Young, who has also fallen a victim to yellow fever.

NOTES

William Mackenzie Memorial Medal

THE first award of the recently instituted William Mackenzie Memorial Medal "In recognition of valuable contributions to Ophthalmology" will be made to Dr. A. Maitland Ramsay, Honorary Director, James Mackenzie Institute for Clinical Research, St. Andrews, Consulting Ophthalmic Surgeon, late Surgeon, Glasgow Royal Infirmary and Ophthalmic Institution.

The presentation will take place in Glasgow, in the autumn, on a date to be arranged, and on that occasion Dr. Ramsay will deliver an address.

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Appointment

DR. H. BOYD CUNNINGHAM has been appointed Ophthalmic Specialist Medical Referee under the Workmen's Compensation Act to County Court Circuits 1 and 2 (Northumberland and Durham).

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An early example of provision for a blind man

In Domesday Book, Vol. I, folio 293, under Snotinghamscire (Notts), is this curious entry, "In Wareshope tenet quidam cecus unam bovatam in elemosina de Rege." In Wareshope a certain blind man holds one bovate in alms of the King.

Pollock and Maitland, History of English Law, Vol. I, p. 241, notice the case, which they refer to under the tenure heading of frankalmoin, or free alms. As time went by the tenure of frankalmoin referred to churches and ecclesiastics almost exclusively. In such instances it occasionally happened that when land was given to a churchman, a definite stipulation was made accompanying the gift, for some service, such as that the donee should sing a mass once a year for the soul of the donor, or for the souls of his ancestors. It is pointed out that gifts in frankalmoin were usually

free from stipulations of any kind, and that such a holding as outlined should really be described as holding by divine service.

This gift in Domesday is apparently made to a layman; he holds his bovate (oxgang) "in elemosina" by way of charity, and Pollock and Maitland say that "perhaps his tenure is precarious."

Ellis, Introduction to Domesday, mentions this blind man in Nottinghamshire, but gives no other example of blindness in the record.

FUTURE ARRANGEMENTS

1928

July 4-7.—Oxford Ophthalmological Congress.

July 25-26.—Annual Meeting, British Medical Association, Section of Ophthalmology at Cardiff.

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology. *May, 1928.*

SPRATT, CHARLES N. The pocket flap in cataract extraction.
DERBY, GEORGE S. Correction of ptosis by fascia lata hammock.
FEJÉR, JULIUS. Subconjunctival lens dislocation.
REDWAY, LAURANCE D. Photomicrography of the living eye.
RODIN, FRANK H., and SWETT, WILBUR F. Tendon transplantation for paralysis of external rectus.
HARDY, WILLIAM F. A consideration of intra-ocular foreign bodies.
GLASS, ROBERT LEE and GARVEY, PAUL H. Papilloedema in acute luetic meningitis and meningoencephalitis.
ALVIS, B. Y. Sporotrichosis of the eyelid.
BROWN, ALBERT L. A case substantiating the relaxation theory of accommodation.

Annales d'Oculistique. *April, 1928.*

VILLARD, H., and DEJEAN, CH. Thrombosis of the central artery of the retina.
MEYERHOF, M. On the subject of the "palpebral hydatids" of the ancients.
DASCALOPOULOS, N. The use of adrenalin in operations on traumatic cataract.
GROS, H. B. A new perimeter.

La Clinique Ophtalmologique. *March, 1928.*

BLUM, J. Contribution to the study of the late oculo-motor syndrome in epidemic encephalitis.

Archiv für Augenheilkunde. Bd. XCIX, Parts 1 and 2.

FRANCESCHETTI, A. and WIELAND, H. Quantitative examination of the albumen content of the intra-ocular fluids with the nephelometer.
GUILLERY, H. Clinical and histological observations on sympathizing rabbit eyes.
SEEFELDER, R. and BERGER, W. Note on the knowledge of rare diseases of the conjunctiva (spring catarrh and hyaline degeneration of the connective tissue).
HEINE, L. On blocking of arteries.
ROELOFS, C. OTTO. Optical localization after squint operation.
YOSHIMOTO, RYOTSUI. Observations on the question of vitamine deficiency in the eye.
On the question of acid and alkali injuries of the eye.
MARCHESANI, O. Note on the non-specific or fever treatment of interstitial keratitis.
GASTEIGER, H. On the question of local immunity of the eye.
PETERS, A. On colloid deposit in the cornea in buphthalmos.
HOUWER, A. W. MULOCK. Thrombosis of the carotid artery with orbital complications.

Klinische Monatsblätter für Augenheilkunde.

FIEGENBAUM, A. On the influence of light and dark on the intra-ocular tension in normal and glaucomatous eyes.
On early and continued disturbance of dark adaptation in glaucoma.
VOGELSANG, K. Comparative researches into the sensibility of cornea and conjunctiva.
PRINS JUNR., C. WINKLER. On pigment at the limbus.
BETSCH, A. Chronic filamentary keratitis as a sequel of deficient lacrymal secretion.
BLATT, N. Malignant course of rosacea keratitis.
KLEIN, N. Ring sarcoma of iris and ciliary body.
VON CSAPODY, J. On treatment of detached retina.
ZBOROWSKY, W. F. A note on the treatment of spastic entropion according to the procedure of L. Weekers.
SZOKOLIK, E. Hungarian plastic operation on the lid.
GOTTFR, ARNOLD. Simple method of accurate measurement of exophthalmos.
MITA, HIROSHI. Experimental investigation of the injurious action of trypaflavin on the eye.
BAB, W. Injuries to the eye in beauty treatment.
FABRITIUS, A. Irregularity and slowing of the pulse in acute glaucoma.
MÜLLER, P. On the use of ephedrin in ophthalmology.
WOLCHONSKY, S. On Parinaud's conjunctivitis.
SCHALL. A new bi-focal spectacle.
NÓNAY, T. Intestinal worms as an aetiological factor in optic neuritis.

Zeitschrift für Augenheilkunde. *May, 1928.*

STEWENS, HERMANN. Congenital motor disturbance of the eye muscles.
V. VOLKMANN, GÜNTER. On the fever treatment of various eye diseases with a new non-specific agent (Pyrifer).
SOMMER, IGNAZ. Labyrinth and strabismus.
GINZBURG, J. Concerning sympathetic inflammation and sympathetic irritation.
KRONFELD, PETER, and BOTHMAN, LOUIS. On the question of respiration of the lens.
VOGELSANG, K. Experimental research into corneal sensibility by means of the method of the reaction tissue.
MYLIUS, K. Sarcoid of Boeck and the eye.
RUTBERG, M. N. A case of streptothrix infection of the tear ducts.

Annali di Ottalmologia e Clinica Oculistica. *May, 1928.*

CUCCHIA. Clinical research into the behaviour of the central and peripheral light sense in affections of the optic nerve.
ANTONIBON. *Estimated modification of* the action of certain drugs used in ocular therapy by potassium.
LUPPINO. Contribution to the knowledge of the 6th nerve nucleus in man.
SCALZITTI. Contribution to the *clinical and anatomico-pathological* study of spindle-celled and melanotic sarcoma of the conjunctiva and the caruncle.
TIERI. Fixation of the globe by means of "the angular fixation ophthalmostat."
FARINA. Effects of acid vital staining on the eye.

Archivio di Ottalmologia. *April, 1928.*

GUGLIANETTI, L. On plasmoma of the conjunctiva.
ROSSI, V. Syndromes of Foville, Bernard-Horner, and Jackson, in a glioma of the pons and medulla (clinical, histopathological and morphological study).
SGROSSO, S. Trachoma, *follicular* conjunctivitis and conjunctival tubercle. Histo-pathological study.

Bolletino d'Oculistica. *April, 1928.*

VERZELLA and GENNARO. The cranio-facial indices and a new facial index in connection with errors of refraction.
DE LOGU. Clinical observations and considerations on ophthalmic migraine.
BESSO. The thermal spa treatment of Salsomaggiore in ophthalmology (continuation).

May, 1928.

SCALINCI. The oculo-auricular syndrome in angio-sclerosis.
NICOLATO. Critchett's method of surgical treatment of hyper-mature and Morgagnian cataract
PAGANI. A method of promoting growth of mucous, epidermic or dermo-epidermic grafts.
MAZZARDI. On a curious corneal change in the cornea in stokers, from the caustic action of lead and fatty acids contained in an ointment applied to the eyelids, in combination with iodine secreted in the tears.
BESSO. The thermal spa treatment of Salsomaggiore in ophthalmology (continued).

Archivos de Oftalmologia Hispano-Americanos. *May, 1928.*

CHARLIN, CARLOS. Optic neuritis caused by syphilis or salvarsan?
CARALT, DELMIRO DE. Hyaline, amyloid, and plasmoid degenerations and petrifying conjunctivitis.
RUIZ, JOSÉ MORÓN. My method of cataract extraction.

June, 1928.

BLANCO, D. TOMÁS. Palpebral autoplasty.
POYALES, F. Complete extraction of cataract.